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Schlumberger

Fax message

To	Paul Rodriguez	Location	
cc		Fax	571-273-3753
From	Kerry Morris	Date	February 15, 2008
Subject	U.S. Serial No. 10/708,719	Pages (inc)	3

Mr. Rodriguez,
I am attaching the 18 formulas for the referenced patent application. Please let me know if these are unclear.

Sincerely yours,

Kerry Morris

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$$E(\overline{\sigma_f}) = \sum_{j=1}^4 \frac{|\sigma_{meas}^j - \sigma_{model}^j(\sigma_m, \overline{\sigma_f}, r, s)|^2}{\varepsilon^j}. \quad (1)$$

$$V_m^i + V_h^i = 0, \quad (2)$$

$$\mathbf{V} = \begin{bmatrix} V_{xx} & V_{xy} & V_{xz} \\ V_{yx} & V_{yy} & V_{yz} \\ V_{zx} & V_{zy} & V_{zz} \end{bmatrix}, \quad (3)$$

$$\mathbf{V} = \begin{bmatrix} V_{xx} & 0 & V_{xz} \\ 0 & V_{yy} & 0 \\ V_{zx} & 0 & V_{zz} \end{bmatrix} \quad (4)$$

$$\begin{bmatrix} V_{xz} \\ V_{yz} \\ V_{zz} \end{bmatrix} \quad (5)$$

$$\begin{bmatrix} V_{xx} & V_{xy} & V_{xz} \\ V_{yx} & V_{yy} & V_{yz} \\ V_{zx} & V_{zy} & V_{zz} \end{bmatrix} \quad (6)$$

$$E_T(\overline{\sigma_{fh}}, \overline{\sigma_{fv}}) = \sum_{j=1}^4 \sum_{i=1}^N \frac{|\sigma_{meas}^{ij} - \sigma_{model}^{ij}(\sigma_m, \overline{\sigma_{fh}}, \overline{\sigma_{fv}}, r, \alpha, s)|^2}{\varepsilon^{ij}}, \quad (7)$$

$$\overline{\sigma_{appa}} = \begin{bmatrix} \sigma_{xx} & \sigma_{xy} & \sigma_{xz} \\ \sigma_{yx} & \sigma_{yy} & \sigma_{yz} \\ \sigma_{zx} & \sigma_{zy} & \sigma_{zz} \end{bmatrix} \quad (8)$$

$$\overline{\sigma_{appa}} = \begin{bmatrix} \sigma_{hom} & 0 & 0 \\ 0 & \sigma_{hom} & 0 \\ 0 & 0 & \sigma_{hom} \end{bmatrix}. \quad (9)$$

$$R = \begin{bmatrix} \cos \phi & -\sin \phi & 0 \\ \sin \phi & \cos \phi & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad (10)$$

$$\overline{\sigma'}_{appa} = R \overline{\sigma}_{appa} R^T. \quad (11)$$

$$\overline{\sigma}_{appa} = \begin{bmatrix} \sigma_{xx} & 0 & \sigma_{xz} \\ 0 & \sigma_{yy} & 0 \\ \sigma_{zx} & 0 & \sigma_{zz} \end{bmatrix}. \quad (12)$$

$$\begin{aligned} \overline{\sigma'}_{appa} &= R \begin{bmatrix} \sigma_{xx} & 0 & \sigma_{xz} \\ 0 & \sigma_{yy} & 0 \\ \sigma_{zx} & 0 & \sigma_{zz} \end{bmatrix} R^T = \\ &= \begin{bmatrix} \sigma_{xx} \cos^2 \phi + \sigma_{yy} \sin^2 \phi & (\sigma_{xx} - \sigma_{yy}) \sin \phi \cos \phi & \sigma_{xz} \cos \phi \\ (\sigma_{xx} - \sigma_{yy}) \sin \phi \cos \phi & \sigma_{xx} \sin^2 \phi + \sigma_{yy} \cos^2 \phi & \sigma_{xz} \sin \phi \\ \sigma_{xz} \cos \phi & \sigma_{xz} \sin \phi & \sigma_{zz} \end{bmatrix}. \end{aligned} \quad (13)$$

$$\phi_a = -\arctan\left(\frac{\sigma_{yz}}{\sigma_{xz}}\right). \quad (14)$$

$$\phi_b = -\arctan\left(\frac{\sigma_{zy}}{\sigma_{zx}}\right) \quad (15)$$

$$\phi_c = \arctan\left\{ \frac{\sigma_{xx} - \sigma_{yy} \pm \sqrt{(\sigma_{xx} - \sigma_{yy})^2 + 4\sigma_{xy}\sigma_{yx}}}{2\sigma_{xy}} \right\}, \quad (16)$$

$$\phi_d = \arctan\left\{ \frac{\sigma_{xx} - \sigma_{yy} \pm \sqrt{(\sigma_{xx} - \sigma_{yy})^2 + 4\sigma_{xy}\sigma_{yx}}}{2\sigma_{yx}} \right\}. \quad (17)$$

$$\overline{\sigma}_{corr} = R^T \overline{\sigma'}_{corr} R. \quad (18)$$